Unit 1: Pre-Algebra Review

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 1**
Length: **3 Weeks**
Status: **Published**

Brief Summary of Unit

The content studied in pre-algebra courses form an important foundation for the Algebra 1 curriculum. As such, the content deserves a brief review at the start of the new school year. During the first three weeks of the course, students will revisit the axioms of equality, arithmetic with algebraic expressions, how to solve multi-step equations, the relationship between the equation of a line and the appearance of the corresponding graph, how to solve systems of two equations with two variables, and working with the properties of exponents. The instructor will also address and review common arithmetic weaknesses, such as operations with fractions and signed numbers.

Revised Date: July 2024

Standards

8.NS	The Number System
1	Developing Responsibility for Learning: Cultivating independence, self-reflection, and responsibility for one's own learning.
P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
8.EE	Expressions and Equations
3	Recognizing and Defining Computational Problems
A.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
8.EE.B	Understand the connections between proportional relationships, lines, and linear equations
A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
A.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
8.EE.C	Analyze and solve linear equations and pairs of simultaneous linear equations
A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
8.EE.C.8.c	Solve real-world and mathematical problems leading to two linear equations in two variables.
A.REI.C.6	Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables.
8.F.A.3	Interpret the equation □ = □□ + □ as defining a linear function, whose graph is a straight

	line; give examples of functions that are not linear.
A.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
A.REI.D.11	Explain why the □-coordinates of the points where the graphs of the equations □ = □(□) and □ = □(□) intersect are the solutions of the equation □(□) = □(□); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where □(□) and/or □(□) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
A.REI.D.12	Graph the solutions to a linear inequality in two variables as a half plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Essential Questions for a Review of Pre-Algebra

- What are the axioms of equality?
- How does one solve multi-step equations and inequalities with one variable?
- What are "like terms" and what is the distributive property?
- What are the key components of a linear graph?
- What are the three methods for solving a system of two equations?
- How are the properties of exponents used to simplify numerical expressions?

Enduring Understandings for a Review of Pre-Algebra

- Mathematics is a logical system predicated on axioms and clear definitions.
- The axioms of equality are used to solve multi-step equations.
- Algebraic expressions can exist in different and equivalent forms.
- The slope of a line and its y-intercept are key features on a graph.
- Systems of two equations may be solved through substitution, elimination, and by graphing the two lines and identifying their point of intersection.

Objectives for a Review of Pre-Algebra

- The algebraic axioms of equality are foundational for secondary mathematics.
- How to solve multi-step equations, how to solve inequalities with one variable, and how to isolate a given variable in literal equations.
- The equation of a line given in y=mx+b form reveals key information about the appearance of the corresponding graph.
- If you have an equation in two variables, then you can make a graph; and, if you have a linear graph (or are given the coordinates for two points on a line) then you can write the corresponding equation for the line.

Objectives for a Review of Pre-Algebra

- Simplifying algebraic expressions by (A) combining like terms, and (B) using the distributive property.
- Working with signed numbers and working with quantities expressed as rational numbers.
- Solving multi-step equations and checking the validity of their solutions through substitution.
- Solving one variable inequalities and graphing their solutions on a number line.
- Using properties of exponents to simplify numerical expressions.
- Drawing the graph of a linear equation, and write an equation given a linear graph.

Learning Plan for a Review of Pre-Algebra

Week One: Review operations with fractions, signed numbers, and exponents; review the process of simplifying algebraic expressions; and review how to solve linear equations.

Week Two: Use class time to practice solving multi-step equations, one variable inequalities, and systems of two equations with two variables.

Week Three: Students practice drawing graphs for equations given in slope-intercept form, and students practice writing linear equations when given graphs of lines, the coordinates for two points on a line, or the slope and intercept of a line.

A short assessment is given after three weeks, based on the topics included in the summer assignment packet, as well as the review exercises practiced during class time.

Evidence/Performance Tasks for the Review of Pre-Algebra

At the beginning of the year students will be given an important review of pre-algebra content. The instructor will assess students' understanding through their verbal participation in class, their completion of the summer assignment, and their written work with the review exercises practiced during class time. The first three weeks will conclude with a diagnostic test given through IXL that will provide a comprehensive measure of students' understanding at the start of the Algebra 1 curriculum that follows next.

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or IXL practice
- Summative: Teacher-created assessments & NJSLA test bank problems
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from the textbook
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks

Materials for the Review of Pre-Algebra

Core Instructional materials: Lecture notes and classroom activities designed by instructors.
Core Book List including Algebra 1, Pearson Publishing

Supplemental instructional materials: DeltaMath

Suggested Strategies for Modifications

Possible accommodations/modification for Algebra 1